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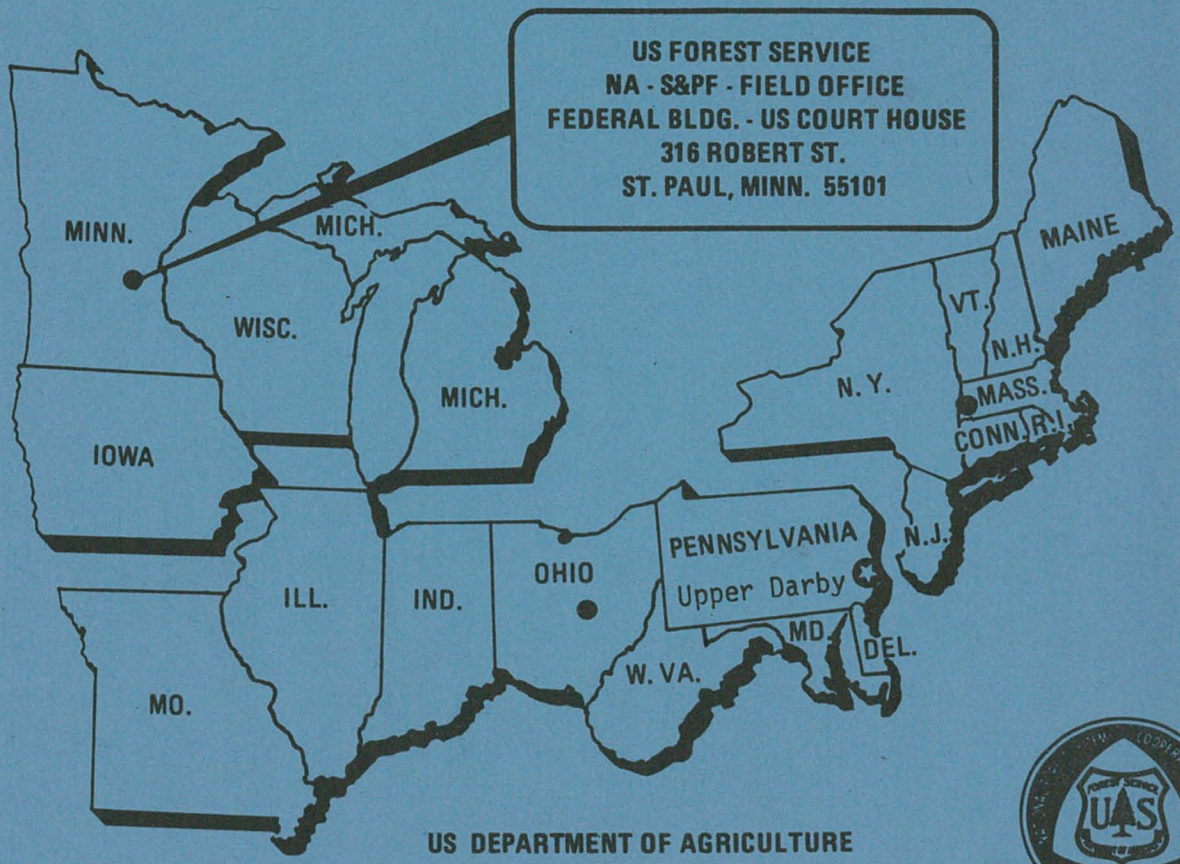
SARATOGA SPITTLEBUG SCAR-COUNT SURVEY RESULTS FROM THE CHEQUAMEGON NATIONAL FOREST, WISCONSIN

By Imants Millers



US DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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ABSTRACT

In 1970, Saratoga spittlebug, Aphrophora saratogensis (Fitch), surveys were completed on 8864 acres of Chequamegon National Forest, Wisconsin. Of these, 280 acres have high spittlebug populations and the areas are recommended for chemical suppressior

INTRODUCTION

The Saratoga spittlebug, Aphrophora saratogensis (Fitch), is one of the major pests of young red pine, Pinus resinosa Ait., plantations in the Lake States.

Adult feeding scars on pine branches are used to estimate the preceeding season's damage and to predict the next years spittlebug populations. Annual scar-count surveys are made in susceptible red pine plantations. Each plantation is examined at least once in four years, but more frequently when spittlebug damage is increasing. The last insecticidal treatment against the spittlebug was done in 1969, when about 500 acres were sprayed (Millers, 1969). Additional spraying appeared necessary for 1970, however, nymphal populations declined and the projects were cancelled (Erickson and Millers, 1969).

BIOLOGICAL REVIEW

A. Causal Agent

The Saratoga spittlebug, Aphrophora saratogensis (Fitch), adult stage.

B. Host

Red pine, Pinus resinosa Ait., is the most susceptible host. Other pine species in the area may be attacked, but damage usually is not serious.
Alternate hosts are Comptonia spp., Rubus spp. and other woody shrubs.

C. Type of Damage

The adult spittlebugs feed on 1-5 year-old internodes of branches and the main stem. Necrotic areas, i.e. scars, are produced in the phloem, cambium and newly formed xylem as a result of the feeding. One season's accumulation of 35 or more scars per 4 linear inches of twig interferes with food and water translocation. At first, stunting of terminal growth occurs. Continued severe feeding in successive years results in branch and terminal dieback, i.e. flagging, and eventually, tree mortality. Thus, economic loss occurs from tree growth reduction, poor tree form and quality, and tree mortality (Ewan, 1961).

D. Ecological Considerations

Briefly, the life history of the spittlebug is as follows (from Anderson, 1947). The adults lay eggs in the fall under scales of large buds - hardwoods as well as pines. In the spring, the eggs hatch and the drop to the ground and search for succullent stems, such as herbs, and new growth of sweetfern. The nymphs feed on plant juices on the root collar of the host and surround themselves with sweet, watery spittle. As the nymphs grow they migrate to larger woody stems, although sweetfern is preferred throughout development. By the latter part of July, the nymphs transform into adults and change feeding to pine branches.

Spittlebug abundance is related to the host and alternate hosts available for oviposition, nymphal development and adult feeding (Ewan, 1961). Generally, red pine plantations in the Lake States are susceptible to outbreak populations after the trees are 2 feet tall and until crown closure eliminates alternate hosts, i.e. tree height of about 14 feet with stocking of 1000 trees per acre. Tree stunting and mortality in unchecked spittlebug outbreaks help to maintain open red pine stands and thus prolong outbreak conditions. Other red pine pests, such as white grub, Scleroderris pine canker and defoliators also produce plantation conditions favorable for spittlebug outbreaks.

Weather is another ecological factor that can have adverse effects on spittlebug populations. Spittlebug nymphs are relatively protected at the root collar of the alternate host. However, late spring temperatures in the low 20's may cause nymphal mortality. The nymphs are also susceptible to desiccation during migration, first from red pine to herbaceous plants and later to woody shrubs.

SURVEY METHODS

Scar-count surveys were used to detect and evaluate Saratoga spittlebug outbreaks. On the Chequamegon National Forest the surveys were conducted by Ranger District personnel according to instructions provided by the St. Paul Field Office.

Approximately 20 samples were taken in each plantation. Each sample consisted of a 4 inch long twig taken from the penultimate internode of an upper crown branch.

The number of scars in the xylem were counted and recorded to the nearest 10. The severity of damage was classified as follows:

light - less than 10 scars
moderate - 20 scars
heavy - 30 or more scars

When heavey damage is found on several samples in a portion of a plantation, the entire plantation is rated as heavily infested. Additional surveys are needed to evaluate the outbreak more precisely. In addition, surveys are also recommended for plantations in the vicinity of the infested stand.

RESULTS AND DISCUSSION

Almost 9000 acres, in 156 red pine plantations, were surveyed for Saratoga spittlebug damage (Figure 1). District summaries and recommended actions are given in Table I. Chemical suppression is recommended for 7 plantations covering 280 acres (Table II). Continued scar-count surveillance is recommended for 72 plantations. Fifteen plantations have outgrown spittlebug hazards. Six plantations have heavy hardwood overstory. Since adequate spray coverage cannot be achieved, when needed, we recommend that these areas be dropped from surveys until the overstory is removed. The Districts have indicated that 46 plantations (1389 acres) are failures and additional 10 plantations (57 acres) are too small for economical management.

The plantations recommended for suppression and nymphal surveys had heavy scar-counts in 1970. It is not known how long the spittlebug damage has been present. Ewan (1961) states that branch mortality, or flagging, begins after 2 years of heavy damage, and tree mortality is likely to occur after 3 or more years of outbreak. On basis of these scar-counts, chemical suppression is recommended. However, more precise damage predictions will be available after examination by our entomologist in June.

TABLE I--SUMMARY OF SS SCAR-COUNT SURVEY AND RECOMMENDATIONS
FOR CHEQUAMEGON NATIONAL FOREST - 1970

District	Plantations Surveyed		RESURVEYS RECOMMENDED								DROP FROM FURTHER SURVEYS							
			Nymphal		SC-'73		SC-'74		SC-'75		No SS Hazard		Until Release		Area Failed		Area Too Small	
	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres
Glidden	23	1032	2	63	3	113	2	70	2	198	0	0	2	168	12	420	0	0
Hayward	44	1257	1	39	0	0	1	109	8	239	5	144	0	0	22	686	7	40
Medford	8	195	0	0	0	0	0	0	0	0	3	154	0	0	2	24	3	17
Park Falls	15	564	3	155	1	73	4	132	3	137	1	20	0	0	3	47	0	0
Washburn	66	5816	1	23	9	715	23	2672	16	961	6	220	4	1013	7	212	0	0
Forest Totals	156	8864	7	280	13	901	30	2983	29	1535	15	538	6	1181	46	1389	10	57

TABLE II--PLANTATIONS RECOMMENDED FOR SS NYMPHAL SURVEY IN 1971

Location 1/				Area	Tree Height	Stocking
T	R	S	1/4	Acres	Feet	Trees/Acre
Glidden Ranger District						
42N	4E	19	SW	22	5	600
42N	4E	9,16	E/2	41	5	500
Hayward Ranger District						
43N	5E	8	NE	39	7	400
Park Falls Ranger District						
40N	3E	32	SW	35	5	600
39N	1E	14,23		60	6	500
39N	1E	23,24,26		60	6	500
Washburn Ranger District						
48N	6E	32	SE	23	8	500
		Total		280		

1/ T-Township; R-Range; S-Section; 1/4-Quarter section.

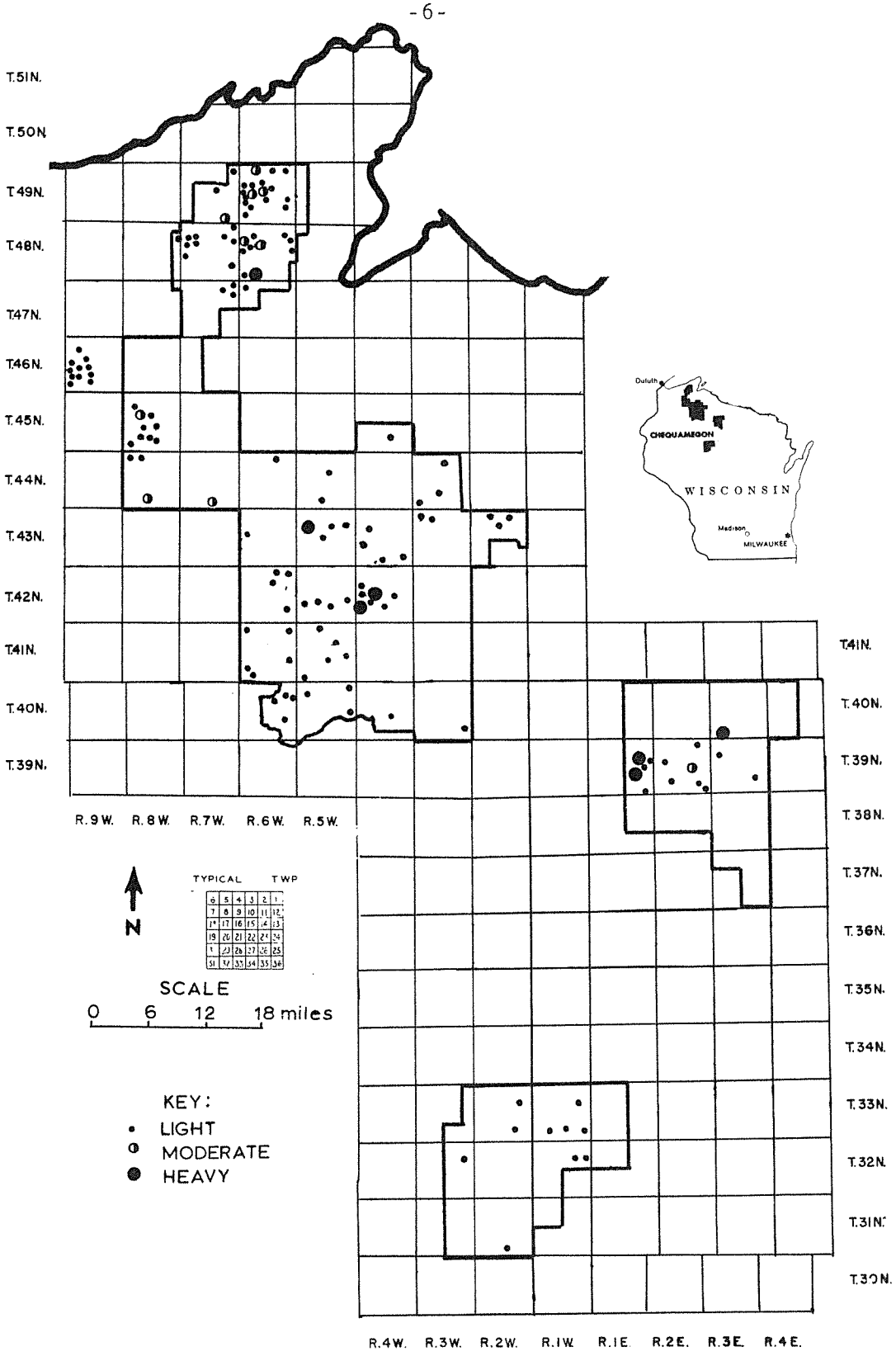

Figure 1. Distribution of Saratoga spittlebug damage, as based on scar-count survey, on Chequamegon National Forest - 1970.

SUPPRESSION INFORMATION

Malathion, applied at 10 fl. oz. per acre as ultra-low volume spray, is recommended for Saratoga spittlebug control. The insecticide is applied from aircraft at the time when practically all spittlebugs are adults--usually in late July or early August. The estimated cost of about 1000 acre control project is $5.00 per acre for insect surveys, marking, insecticide and application costs.

Malathion is a relatively safe insecticide at the recommended rate. However, normal safety precautions specified on the label should be observed. Avoid spraying over residences, vehicles and open waters. Malathion is toxic to bees, and beekeepers in the vicinity of spray areas should be warned.

RECOMMENDATION

High spittlebug populations are expected in 29 plantations covering 2240 acres. Chemical suppression is recommended if resource values justify the costs. However, the Forests' preliminary planning for a suppression project should be undertaken with the understanding that more precise evaluation will be made in the summer of 1971.

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